



# THE MERCK INDEX

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THIRTEENTH EDITION

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**[NaNO<sub>2</sub>. Thermodynamic properties.** *Khim.* 40, 1843 (1967). C.A. 64, 133b (1969); H. F. Smyth *et al.*, *Am. J.* (1969). Review of chemistry of m as related to meat curing: *Bard, & Meat Products*, J. F. Price, B. S. Seman, 2nd ed. (1971) pp 452-470. Hygroscopic granules, rods, or powder to nitrate in air. d 2.17. mp 271.5. parts cold water, 0.6 part boiling even by weak acids with evolution of aq soln is alkaline. pH ~9. Keep at: 180 mg/kg (Smyth). *Incompatibilities*: hypophosphites, iodides, sulfites, tannic acid, vegetable acids or tinctures.

Government regulation to determine food. nitroso compds, and in many other nic chemicals; dyeing and printing of silk, and linen; photography. In preserving; in processing smoked meat chemistry. antitode (cyanide poisoning). anide poisoning. Has been used as a (blood pressure) depressant and as a.

**ruesside.** [14402-89-2] Pentakis- disodium; sodium nitrosylum nitroferri cyanide; sodium nitro- Na<sub>2</sub>O; mol wt 261.92. C 22.93%, 17.55%, O 6.11%. Na<sub>2</sub>[Fe(CN)<sub>5</sub>]. *oc. Roy. Soc. London* 5, 846 (1849). *et al.*, *Arch. Inst. Farmacol. Exp.* Review: I. H. Tuzel, *J. Clin. Phar.* Review of pharmacology, toxicol. J. H. Tinker, J. D. Michenfelder. Comprehensive description: *R. Subs.* 6, 487-513 (1977); A. Bull *et al.* Nipride; Nitropress. Ruby-red, urient crystals. Sol in ~2.3 parts water, wly dec in aq soln. ection of many organic compds, e.g., alkali sulfides, zinc, SO<sub>2</sub>. ensive.

**e.** [62-76-0] Ethanedioic acid disodium salt. C 17.93%, Na 34.31%, O 134.00.

**der.** Sol in 27 parts water, 16 part sol. The aq soln is practically neutral. ptoms of overexposure by ingestion: sophagus, stomach; vomiting; weak, i, cardiovascular collapse; headache, vulsions, stupor, coma; kidney damage. *ogy of Commercial Products*, R. E. iams & Wilkins, Baltimore, 5th ed., 128.

tanning and finishing leather. for manganate soln.

**s.** [1313-59-3] Sodium monoxide. 4.18%, O 25.81%. s or powder. d 2.27. Melts at a dull c >400° into sodium peroxide and and combines violently with water. *s. Handle with tongs and not by closed.* agent; in certain chemical reactions ensing agent.

**rate.** [7632-04-4] Dextol. BNaO<sub>2</sub> 28.11%, O 58.68%. NaBO<sub>2</sub> 2. sh, ~95% of the perborate corresp

available oxygen. Prepn from sodium metaborate and hydrogen peroxide: Leblon, Lambert, US 3109706 (1963 to Solvay & Cie.).

**Tetrahydrate.** White, odorless, cryst powder; saline taste. Stable when kept cool and dry, but is dec with liberation of oxygen in warm or moist air. Dec >60°. Sol in ~40 parts water, the soln being alkaline and dec with the liberation of H<sub>2</sub>O, and then of oxygen. In the presence of acids, H<sub>2</sub>O<sub>2</sub> is formed. *Keep well closed and in a cool place.*

**Caution:** Prevent swallowing of soln. **USE:** Bleaching straw and other fibers, ivory, sponges, brushes, waxes, textiles; in laundering, dentifrices, soaps.

**THERAP CAT:** Antiseptic (topical).

**THERAP CAT (VET):** Mouthwash.

**8726. Sodium Perchlorate.** [7601-89-0] Irenat. ClNaO<sub>4</sub>; mol wt 122.44. Cl 28.96%, Na 18.78%, O 52.27%. NaClO<sub>4</sub>.

**Monohydrate.** White, deliquescent crystals. Dec ~130°. d 2.02. Very sol in water. *Keep well closed.*

**USE:** In the explosives industry.

**THERAP CAT:** Thyroid inhibitor.

**8727. Sodium Permanganate.** [10101-50-5] MnNaO<sub>4</sub>; mol wt 141.93. Mn 38.71%, Na 16.20%, O 45.09%. NaMnO<sub>4</sub>.

**Trihydrate.** Reddish-black, very hygroscopic granules. Very sol in water; dec by alcohol.

**8728. Sodium Peroxide.** [1313-60-6] Sodium dioxide; sodium superoxide; Solozone. Na<sub>2</sub>O<sub>2</sub>; mol wt 77.98. Na 58.96%, O 41.03%. The product of commerce contains 90-95% Na<sub>2</sub>O<sub>2</sub>. Prepd by heating sodium metal to 300° in aluminum vessels with a current of air from which carbon dioxide has been removed. Prepn of the octahydrate: Penneman, *Inorg. Syn.* 3, 11 (1950).

Yellowish-white, granular powder. Absorbs water and CO<sub>2</sub> from the air. Freely sol in water, forming sodium hydroxide and hydrogen peroxide, the latter quickly dec into oxygen and water. With dil acids H<sub>2</sub>O<sub>2</sub> is formed which remains stable. In contact with organic matter or readily oxidizable substances ignition and explosion may take place. *Keep tightly closed and protected from contact with organic or oxidizable substances.*

**Caution:** Irritant and corrosive. See Sodium Hydroxide.

**USE:** Bleaching animal and vegetable fibers, feathers, bones, ivory, wood, wax, sponges, coral; rendering air charged with CO<sub>2</sub> respirable as in torpedo boats, submarines, diving bells, etc.; purifying air in sick rooms; dyeing and printing textiles; chemical analysis. General oxidizing agent.

**8729. Sodium Persulfate.** [7775-27-1] Sodium peroxydisulfate. Na<sub>2</sub>O<sub>8</sub>S<sub>2</sub>; mol wt 238.10. Na 19.31%, O 53.76%, S 26.93%. Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub>. Toxicity data: DaVal, *Arch. Ital. Sci. Farmacol.* 2, 445 (1933).

White, cryst powder. Gradually dec; decompn is promoted by moisture and higher temp. Initial soly in water at 20°: 549 g/l; dec by alcohol and silver ions. MLD in rabbits (mg/kg): 178 i.v. (DaVal).

**Caution:** Highly irritating to skin, mucous membranes.

**USE:** Bleaching and oxidizing agent; promoter for emulsion polymerization reactions.

**8730. Sodium Pertechnetate <sup>99m</sup>Tc.** [23288-60-0] Pertechnetate. Ultra-Technekow. NaO<sub>2</sub><sup>99m</sup>Tc. <sup>99m</sup>TcO<sub>4</sub>. Prepn: Keller, Kapellakopoulos, *Radiochim. Acta* 1, No. 2, 107 (1963), C.A. 59, 1256a (1963); Kanellakopoulos, *AEC Accession No. 31424*, Rept. No. KFK-197, 73 pp (1964), C.A. 62, 7350d (1965). Clinical application for labelling red blood cells: D. Ducassou *et al.*, *Brit. J. Radiol.* 49, 344 (1976). Diagnostic use in Meckel's diverticulum: D. R. Cooney *et al.*, *J. Pediatr. Surg.* 17, 611 (1982); in thyroid neoplasm: M. Vorne, K. Jarve, *Eur. J. Nucl. Med.* 13, 362 (1987). Review of diagnostic use in brain scanning: J. G. McAfee *et al.*, *J. Nucl. Med.* 5, 811-827 (1964); in thyroid function: M. S. Sucupira *et al.*, *Int. J. Nucl. Med. Biol.* 10, 29-33 (1983).

**THERAP CAT:** Diagnostic aid (radioactive imaging agent).

**8731. Sodium Phenolsulfonate.** [1300-51-2] Hydroxybenzenesulfonic acid sodium salt; sodium sulfocarbonate. C<sub>6</sub>H<sub>5</sub>-

NaO<sub>3</sub>S; mol wt 196.16. C 36.74%, H 2.57%, Na 11.72%, O 32.62%, S 16.35%. HOC<sub>6</sub>H<sub>4</sub>SO<sub>3</sub>Na.

**Dihydrate.** White, odorless crystals; slightly bitter taste; somewhat efflorescent in dry air. One gram dissolves in 4.2 ml water, 0.8 ml boiling water, 140 ml alcohol, 13.5 ml boiling alcohol, 5 ml glycerol. The aq soln is neutral.

**THERAP CAT:** Intestinal antiseptic.

**THERAP CAT (VET):** Has been used as an intestinal antiseptic, in dusting powders for ulcers, slowly granulating wounds and in dilute solution in the eye.

**8732. Sodium Phenoxide.** [139-02-6] Sodium phenate; sodium carboxylate; sodium phenolate; phenol sodium. C<sub>6</sub>H<sub>5</sub>-NaO; mol wt 116.09. C 62.08%, H 4.34%, Na 19.80%, O 13.78%. C<sub>6</sub>H<sub>5</sub>ONa. Prepn from phenol and NaOH in dil methanol: Kornblum, Lurie, *J. Am. Chem. Soc.* 81, 2710 (1959).

White to reddish, deliquescent rods or granules. Decomposed by the CO<sub>2</sub> of the air. Very sol in water; sol in alcohol. The aq soln is caustic.

**8733. Sodium Phosphate, Dibasic.** [7558-79-4] Dibasic sodium phosphate; disodium hydrogen phosphate; disodium orthophosphate; disodium phosphate; DSP; phosphate of soda; secondary sodium phosphate. HNa<sub>2</sub>O<sub>4</sub>P; mol wt 141.96. H 0.71%, Na 32.39%, O 45.08%, P 21.82%. Na<sub>2</sub>HPO<sub>4</sub>. Industrial production: Faith, Keyes, & Clark's *Industrial Chemicals* (John Wiley, New York, 4th ed., 1975) pp 746-754. Toxicity of heptahydrate: H. F. Smyth *et al.*, *Am. Ind. Hyg. Assoc. J.* 30, 470 (1969).

Anhydr, *exsiccated sodium phosphate*. Hygroscopic powder. On exposure to air will absorb from 2 to 7 mols H<sub>2</sub>O, depending on the humidity and temp. Sol in ~8 parts water, much more sol in hot water. Soly per 100 gal water increases from ~14 lbs at slightly >0° to over 900 lbs at 95°. Insol in alc. pH of 1% aq soln at 25°: 9.1. *Keep well closed.*

**Dihydrate.** Sorensen's phosphate; Sorensen's sodium phosphate.

**Heptahydrate.** Crystals or granular powder. Stable in the air. d ~1.7. Sol in 4 parts water, more sol in boiling water; practically insol in alcohol. The aq soln is alkaline, pH ~9.5. LD<sub>50</sub> orally in rats: 12.93 g/kg (Smyth).

**Dodecahydrate.** Translucent crystals or granules; readily loses 5 mols of water on exposure to air at ordinary temp. mp 34-35° (when it contains the full 12 mols of H<sub>2</sub>O). d ~1.5. Sol in 3 parts water; practically insol in alcohol. Aq soln is alkaline, pH ~9.5. *Keep well closed and in a cool place. Incompat:* Alkaloids, antipyrine, chloral hydrate, lead acetate, pyrogallol, resorcinol.

**Caution:** Anhydr form may cause mild irritation to skin, mucous membranes; intern. causes purging.

**USE:** As sequestrant, emulsifier and buffer in foods. As mordant in dyeing; for weighting silk; in tanning; in manuf of enamels, ceramics, detergents, boiler compds; as fireproofing agent; in soldering and brazing instead of borax; as reagent and buffer in analytical chemistry.

**THERAP CAT:** Cathartic.

**THERAP CAT (VET):** Laxative.

**8734. Sodium Phosphate, Monobasic.** [7558-80-7] Sodium biphosphate; sodium dihydrogen phosphate; acid sodium phosphate; monosodium orthophosphate; primary sodium phosphate. H<sub>2</sub>NaO<sub>4</sub>P; mol wt 119.98. H 1.68%, Na 19.16%, O 53.34%, P 25.82%. NaH<sub>2</sub>PO<sub>4</sub>. It is about 99% pure.

**Monohydrate.** White, odorless, slightly deliquescent crystals or granules. At 100° loses all its water; when ignited it converts into metaphosphate. Freely sol in water; practically insol in alcohol. The aq soln is acid. pH of 0.1 molar aq soln at 25°: 4.5.

**Dihydrate.** Orthorhombic bisphenoidal colorless crystals, mp 60°. d 1.915. At room temp crystallizes with 2H<sub>2</sub>O. Directions for max yield: Beans, Kiehl, *J. Am. Chem. Soc.* 49, 1878 (1927).

**USE:** In baking powders; in boiler water treatment; as dry acidulant and sequestrant for foods: Tidridge, Pals, US 3030213 (1962 to FMC).

**THERAP CAT:** Urinary acidifier.

**THERAP CAT (VET):** Urinary acidifier.

pectorant; iodine supplement; iobacillosis, actinomycosis. For et. In iodine deficiency and in or mercury. Orally only, not by parent of bursal enlargements.

**anate(VI).** [10294-64-1]  $K_2Na_2O_7$ . Yellowish, Mn 27.87%, O 32.46%. *Z. Anorg. Allgem. Chem.* 277, 190°. Sol in water. Sol and stable ing agent. With HCl it gives free

**disulfite.** [16731-55-8] Potassium 222.32. K 35.17%, O 35.98%, S of commerce contains ~95%  $K_2S_2O_5$ .

under; sulfur dioxide odor; acid mds; oxidizes in air to sulfate, more. It may catch fire if much heatedly sol in water; insol in alcohol.

in breweries and wineries; bleaches fruits and vegetables.

**aphosphate.** [7790-53-6] Potassium polymetaphosphate; potassium high mol wt polymer; degree of polymerization in preparative conditions. Prepd by J. Am. Chem. Soc. 74, studies: Jost, *Acta Cryst.* 16, 62, 25B, 1110 (1969); *idem*, *ibid.* 27B, metaphosphates: J. R. Van Wazer, *in* *vol 1* (Interscience, New York, 1965). *Inorg. Chem. Radiochem.*

ls.  $d_{20}^{25}$  2.45. Insol in pure water. Sol (except potassium) salts.

**thyl Sulfate.** [562-54-9]  $CH_3KSO_4$ . H 2.01%, K 26.03%, O 42.61%.

crystals. Sol in water, alcohol. ses.

**lybdate(VI).** [13446-49-6]  $K_2MoO_4$ . Mo 40.29%, O 26.87%. deliquescent, cryst powder. d 2.3; m; insol in alc. *Keep well closed.*

**trate.** [7757-79-1] Saltpeter, nitrate. 38.67%, N 13.85%, O 47.48%.

crisms, white granular or cryst powder. d 2.11; mp 333°; dec at 400° with am dissolves in 2.8 ml water, 0.5 ml alc. Sol in glycerol; insol in abs alc. lowering of the temp. pH ~7. LD<sub>50</sub> anion/kg, Dollahite, Rowe, *Southwest*

large quantities may cause violent exposure to small amts may produce emia, nephritis.

luxes, pickling meats; manuf glass-asting powders; freezing mixtures; treating tobacco to make it be

c.

**Nitrite.** [7758-09-0]  $KNO_2$ ; mol wt 54.6%, O 37.60%. The nitrite of potassium ~85%  $KNO_2$ , the remainder contains

flow, deliquescent granules or rods. In the evolution of brown fumes of nitrogen p 441° (decompn starts at 350°). Sol in alc. The aq soln is alkaline.

enclosed. LD<sub>50</sub> orally in rabbits: 108 mg anion/kg, Dollahite, Rowe, *Southwest Vet.* 27, 246 (1974).

USE: In analytical chemistry.

Therap CAT: Vasodilator; antidote (cyanide poisoning).

**7735. Potassium Oleate.** [143-18-0] Oleic acid potassium salt. Approx  $C_{18}H_{33}KO_2$ . Yellowish or brownish, soft mass. Sol in water, alc. The aq soln is alkaline to phenolphthalein. *Light*: Detergent.

**7736. Potassium Oxalate.** [583-52-8]  $C_2K_2O_4$ ; mol wt 166.22. C 14.45%, K 47.04%, O 38.50%.  $K_2C_2O_4$ .

Occurs as the monohydrate, colorless, odorless crystals; efflorescent in warm dry air. *Poisonous!* d 2.13. Loses its water at 160° when ignited is converted into carbonate without appreciable charring. Sol in 3 parts water.

USE: Cleaning and bleaching straw, removing stains in photography; *in vitro* blood anticoagulant; also in analytical chemistry.

**7737. Potassium Percarbonate.** [589-97-9]  $C_2K_2O_6$ ; mol wt 198.21. C 12.12%, K 39.45%, O 48.43%.  $K_2C_2O_6$ . Prep of practically anhydrous compd: Partington, Fathallah, *J. Chem. Soc.* 1950, 1934.

**Monohydrate.** White, granular mass. Sol in water with evolution of oxygen. One part potassium percarbonate is sol in 15 parts of cold water; dec in boiling water; 100 parts water dissolve 6.5 parts potassium percarbonate at ordinary temp. *Keep dry and protected from light.*

USE: Strong irritant. Causes vomiting if swallowed. Large quantities can be fatal.

Has been used in microscopy for detecting tubercle bacilli stained with fuchsin in smears; in photography under the name *Anti-hypo*, to remove last traces of sodium thiosulfate; also as oxidizing agent in chem analyses, but is no longer favored.

**7738. Potassium Perchlorate.** [7778-74-7] Peroidin; perchlorate.  $ClKO_4$ ; mol wt 138.55. Cl 25.59%, K 28.22%, O 46.19%.  $KClO_4$ .

Colorless crystals or white, cryst powder. Dec at 400°; also dec by organic matter, oxidizable substances and on concussion, but is less reactive than the chlorate. d 2.52. Sol in 65 parts cold water, 15 parts boiling water; practically insol in alcohol.

USE: In explosives, pyrotechnics and photography, in analytical chemistry.

**7739. Potassium Periodate.** [7790-21-8] Potassium periodate.  $IKO_4$ ; mol wt 230.00. I 55.18%, K 17.00%, O 77.83%.  $KIO_4$ . Prepd by oxidizing potassium iodate with chlorine in alkaline soln: Hill, *J. Am. Chem. Soc.* 50, 2678 (1928); *ibid.* 61, 171 (1939).

Colorless tetragonal crystals,  $d_4^{25}$  3.618. mp 582°. Soly in water (g/100 g  $H_2O$ ): 0.168 at 0°; 0.42 at 20°; 0.93 at 40°; 2.16 at 60°; 4.44 at 80°; 7.87 at 100°; also given as 0.66 at 13°. Slightly sol in aq KOH.

USE: Highly irritating to skin, eyes, mucous membranes. *Light*: Powerful oxidizer in acid soln, oxidizing manganese compds to permanganate; used for this purpose in analytical chemistry (colorimetric estimation of Mn), also for the oxidation of some organic compds.

**7740. Potassium Permanganate.** [7722-64-7] Permanganic acid potassium salt; chameleon mineral.  $KMnO_4$ ; mol wt 158.03. K 24.74%, Mn 34.76%, O 40.50%. Prepn from manganese ore by electrolytic oxidation: *Faith, Keyes & Clark's Industrial Chemicals*, F. A. Lowenheim, M. K. Moran, Eds. Wiley-Interscience, New York, 4th ed., 1975) pp 679-683. Toxicity study: H. F. Smyth *et al.*, *Am. Ind. Hyg. Assoc. J.* 30, 110 (1969).

Dark purple or bronze-like, odorless crystals. Almost opaque to transmitted light and of a blue metallic luster by reflected light. Sweet with astringent aftertaste; stable in air. Dec ~240° with evolution of oxygen. d 2.7. Soluble in 14.2 parts cold, 3.5 parts boiling water. Dec by alc and many other organic solvents, also by coped acids with liberation of oxygen; with HCl, chlorine is liberated. Readily dec by many reducing substances,

such as ferrous salts, iodides, oxalates, etc., especially in the presence of an acid. *Caution:* Take great care in handling as explosions may occur if it is brought into contact with organic or other readily oxidizable substances, either in soln or in the dry state. *Incompat.* Alcohol, arsenites, bromides, iodides, hydrochloric acid, charcoal; organic substances generally; ferrous or mercurous salts, hypophosphites, hyposulfites, sulfites, peroxides, oxalates. LD<sub>50</sub> orally in rats: 1.09 g/kg (Smyth).

*Caution:* Dilute solns are mildly irritating and high concns are caustic.

USE: Bleaching resins, waxes, fats, oils, straw, cotton, silk and other fibers and chamois skins; dyeing wood brown; printing fabrics; washing CO<sub>2</sub> in manuf mineral waters; exterminating *Oidium tuckeri*; photography; tanning leathers; purifying water; with formaldehyde soln to expel formaldehyde gas for disinfecting; as an important reagent in analytical and synthetic organic chemistry.

Therap CAT: Anti-infective (topical).

Therap CAT (VET): Antiseptic (topical), astringent, deodorant.

**7741. Potassium Persulfate.** [7727-21-1]  $K_2O_8S_2$ ; mol wt 270.32. K 28.93%, O 47.35%, S 23.72%.  $K_2S_2O_8$ . The article of commerce contains 93-97%  $K_2S_2O_8$ .

Colorless or white, odorless crystals. Gradually dec, losing available oxygen; dec more quickly at higher temps; completely dec ~100°. A powerful oxidizing agent. Sol in ~50 parts water, 25 parts water at 40°; insol in alc; the aq soln dec at ordinary temp and more rapidly on warming. The aq soln is acid. *Keep well closed, in a cool place.*

USE: Bleaching fabrics, soaps; in photography under the name *Anthion* to remove last traces of thiosulfate from plates and paper; in analytical chemistry.

**7742. Potassium Phenoxide.** [100-67-4] Phenol potassium salt; potassium phenate; potassium phenylate; potassium carboxylate.  $C_6H_5KO$ ; mol wt 132.20. C 54.51%, H 3.81%, K 29.58%, O 12.10%.  $C_6H_5OK$ . Prepd from phenol and KOH in dil methanol: Kornblum, Lurie, *J. Am. Chem. Soc.* 81, 2710 (1959).

White to reddish, hygroscopic, cryst lumps. Very sol in water; sol in alcohol. The aq soln is strongly alkaline. *Keep tightly closed.*

**7743. Potassium Phosphate, Dibasic.** [7758-11-4] Dipotassium phosphate; dikaliun phosphate; DKP; dipotassium hydrogen phosphate.  $HK_2O_4P$ ; mol wt 174.18. H 0.58%, K 44.89%, O 36.74%, P 17.78%.  $K_2HPO_4$ .

White, somewhat hygroscopic granules. Very sol in water, slightly in alcohol. 100 g will dissolve rapidly and completely in 67 g of cold water. Converted into pyrophosphate by ignition. The aq soln is slightly alkaline to phenolphthalein. *Keep well closed.*

USE: Buffering agent in antifreeze solns; nutrient in the culturing of antibiotics; ingredient of instant fertilizers; as sequestrant in the prepn of non-dairy powdered coffee creams.

Therap CAT: Cathartic.

**7744. Potassium Phosphate, Monobasic.** [7778-77-0] Potassium biphosphate; potassium acid phosphate; potassium dihydrogen phosphate; monopotassium phosphate; Sörensen's potassium phosphate.  $H_2KO_4P$ ; mol wt 136.09. H 1.48%, K 28.73%, O 47.03%, P 22.76%.  $KH_2PO_4$ .

Colorless crystals or white, granular powder; permanent in air; at 400° loses  $H_2O$ , forming metaphosphate. d 2.34. Sol in ~4.5 parts water. Insol in alcohol. pH 4.4-4.7.

USE: In buffers for determination of pH. Pharmaceutical aid (buffering agent).

**7745. Potassium Phosphate, Tribasic.** [7778-53-2] Tripotassium phosphate.  $K_3O_4P$ ; mol wt 212.27. K 55.26%, O 30.15%, P 14.59%.  $K_3PO_4$ . Purification: Jänecke, *Z. Physik. Chem.* 127, 75 (1927); Simon, Schulze, *Z. Anorg. Allgem. Chem.* 242, 331 (1939).

Deliquescent, orthorhombic crystals.  $d_4^{17}$  2.564. mp 1340°. Soly in water: 43.7% at 0°; 50.8% at 25°; 59.7% at 45.1°. Insol in alcohol. Aq solns are strongly alkaline.

**Octahydrate.** Flat, rectangular platelets, mp 45.1°.